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THESIS

AN ANALYSIS OF THE EFFECTS OF LEADERSHIP
STYLE ON AIRCRAFT MATERIAL READINESS

by

Ronald E. Wagner

December 1979

Thesis Advisor: J. D. Senger

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AN ANALYSIS OF THE EFFECTS OF LEADERSHIP STYLE ON AIRCRAFT MATERIAL READINESS

by

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

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1. INTRODUCTION

> Sea power comprises all those elements that enable a nation to project its military strength seaward and to project and maintain it beyond the seas.
>
> Chester W. Nimitz, Fleet Admiral USN., 1960.

In times of peace, sea power is a difficult national attribute to maintain and measure. It reflects more than maintaining a specified level and force mix of ships and aircraft in the inventory. The inventory must be able to demonstrate a satisfactory immediate mobilization readiness.

Readiness, in turn, is a difficult term to define and measure. Readiness encompasses every facet of military strength and can be broken down into operational, material, personnel, equipment, and combat readiness as well as integrated from unit to fleet readiness.

Operational readiness is the generally accepted term under which the various facets, such as material and personnel, are collected and measured for each unit, command, and fleet.

In naval aviation, measurement of operational readiness culminates with an Operational Readiness Exercise, (ORE), in which each unit demonstrates to inspectors its ability to meet whatever demands may be placed upon it. However, operational readiness should not and is not measured by a week long exercise alone. Detailed records are kept which track a squadron through all phases of its training cycle, as well as its preparation and subsequent deployment.

Demonstrating and maintaining a high degree of operational readiness is an immensely important objective for naval aviation squadrons as it becomes a major input in the selection each year of the best squadron for each type aircraft as recipient of the Battle Efficiency Award presented by each Fleet Commander. Competition for this award is intense, and attainment signifies a team effort that is unsurpassed by all other squadrons.

Operational readiness in the context of the Battle Efficiency Award is the ability of a squadron to demonstrate sustained excellence in the performance of its mission. As such, it is the summation of all the sub-components of readiness; material, personnel, equipment, and combat readiness. Many variables impact a squadron's level of readiness through these sub-components-type of aircraft, sophistication or configuration of the equipment, operating environment, the number of flight hours on the aircraft, the training and level of expertise of the maintenance personnel, the amount of money available for repair and acquisition of new equipment, the training of the pilots, and the maintenance procedures employed with regard to scheduling and use of test gear all have an effect on readiness.

One of the most important determinants of a squadron's operational readiness is the material condition of the aircraft. Maintenance of a high level of material readiness allows the necessary training to ensue and enables successful completion of the assigned mission.

Aircraft material readiness is the primary goal of one department of a squadron; the Maintenance Department. Within the Maintenance Department two key personnel are "in general responsible for the overall productive effort and material support of the department." The actions and reactions of these key leaders, the Maintenance Control Officer (MCO) and the Maintenance Chief Petty Officer (MCPO), directly affect the aircraft material readiness posture.

Although the MCO and MCPO make the daily decisions regarding the scheduling and coordinationg of the maintenance department's workload, their actions are necessarily determined in some measure by the policies of the Commanding and Executive Officers. The emphasis that the CO and XO place on such activities as training, military drills, and flight profiles establishes the manner in which the maintenance function is to proceed.

Every squadron contains these four key leaders and they can be thought of as two dual leadership teams, CO and XO, MCO and MCPO. The CO and XO are responsible for the efficient operation of the squadron as a whole. The MCO and MCPO are specifically responsible for the efficient operation of the maintenance, support and repair of assigned aircraft.

The emphasis that each of these dual leadership teams place on the activities necessary to achieve a consistently high degree of operational and aircraft material readiness can be represented as leadership style. The intent of this

thesis is to determine the correlations between the leadership style of the dual leadership teams previously mentioned and aircraft material readiness.

II. BACKGROUND

Naval Aviation has always emphasized adherence to sound management policies and practices and sought to maintain a high degree of readiness through innovative leadership.

Unfortunately, operational requirements, Naval Aviation's "anywhere, anytime" attitude, and the tempo of carrier operations make strict adherence to established guidelines appear less desirable than completion of the present task or dissolution of the current crisis. Management becomes reactionary and leadership inconsistent all too frequently.

The pressure to depart from the exacting procedures, easily adhered to under normal circumstances, varies directly with the pressure associated with extraordinary requirements and indiscriminant competitiveness. These outside pressures are then translated to the organizational maintenance personnel and result frequently in a trade-off of mission performance for an increased sortie or hours flown rate.

Squadron operational and maintenance procedures can vary considerably within the Naval Aviation Maintenance Program, (NAMP), guideline. Leadership through the chain of command in each squadron determines the degree of adherence or departure from the procedures outlined in the NAMP. A short-sighted view of readiness without regard to all that it entails

can lead to seemingly appropriate actions within established policies that degrade readiness in the long term or sacrifice one type of readiness for another.

A. SQUADRON ORGANIZATION

One particular community in Naval Aviation has been increasingly subjected to extraordinary demands and displayed unusual competitiveness in the performance of its numerous missions. The Light Attack community of Naval Aviation has continually exhibited the capability to perform varying missions outside the original intent for its aircraft;the A7E, Corsair II.

This phenomenon has been largely the result of the A7E aircraft itself which has demonstrated an unusual capacity to accept additional mission requirements with a minimum of modifications. Leadership within the Light Attack wings of both the Atlantic and Pacific Fleets has been forced to deal with the pressures inherent in Naval Aviation in a very dramatic way.

The A7E aircraft is an all weather, single seat, attack aircraft that performs a variety of missions including: bomber, fighter, tanker, electronic counter-measures, and reconnaisance. Each A7E squadron maintains approximately ten aircraft with assignments varying dependent upon whether deployed afloat or ashore.

The squadrons each have approximately 240 personnel assigned, 20-24 officers, and 220 enlisted. The Commanding Officer is normally an O-5 pay grade and serves a tour of from 30-36 months.

The first half of his tour with the squadron is spent as the Executive Officer, (XO), and the second half as the Commanding Officer, (CO).

Each squadron is administratively separated into four departments: Administration, Operations, Safety, and Maintenance. Within the maintenance department there are three permanently assigned "ground" officers - a Limited Duty Officer (LDO), normally assigned as the Maintenance Control Officer, (MCO), a Warrant Officer, normally assigned as the Ordnance Officer, and an Aviation Maintenance Duty Officer, (AMDO), assigned various billets. These "ground" officers are assigned to their respective billets for a 36 month tour, subject to the wishes of the CO.

The maintenance department represents the largest portion of the assigned enlisted who perform the actual maintenance and support of the aircraft. Their actions are directed by the Maintenance Chief Petty Officer, (MCPO), who is normally assigned for a 36 month tour.

The specific duties of the four key individuals, or leaders, are listed in two separate yet explicit instructions. Navy Regulations establishes the duties of the CO and XO, while the Naval Aviation Maintenance Program, (NAMP), manual defines the duties of the MCO and MCPO.

Under Navy Regs the CO and XO are responsible for the efficient operation of the squadron as a whole. The CO is further tasked with the responsibility for the safety, well-being, and efficiency of his entire command. The XO is,

"primarily responsible, under the CO, for the organization, performance of duty, and good order and discipline of the entire command," [Navy Regs, 1974].

Although the duties of each member of this dual leadership team are clearly delineated, in actual practice the dividing line between duties of the CO and XO are not nearly so clear cut. The CO establishes the duties of both assuming certain responsibilities and hence implicitly determines the duties of the XO by leaving the remainder to him.

Inherent in the task of efficient operation of the squadron as a whole are two dichotomous functions that must be performed by the CO, XO team; accomplishment of the task and assurance of the safety and well-being of the entire command. These functions can be performed by one, or both, or divided between the members of the CO-XO leadership team.

The NAMP sets forth the duties of the MCO as "in general responsible to the Maintenance Officer for the overall productive effort and material support of the department." Among the specific duties listed by the NAMP for the MCO are; coordinating/monitoring the department workload, establishing procedures to effectively control the daily workload, assignment of work priorities, and issuing maintenance instructions, as required, to ensure adequate communication and control.

Although the NAMP does not specifically delineate the duties of the Maintenance Chief Petty Officer, the MCPO as head of the Maintenance Control Work Center assumes the responsibilities of ensuring the function is properly carried out. Among the duties listed by the NAMP for the Maintenance

Control Work Center are; assign job control number and priority for each maintenance action, maintain current equipment status, assign work to appropriate work centers, maintain cognizance of all uncompleted maintenance actions, and take necessary action for reporting configuration, material readiness, and flight data [OPNAVINST 4790.6E].

As with the CO-XO dual leadership team, the MCO and MCPO duties are not rigidly separated. Dependent upon the policies of the CO, XO, or Maintenance Officer the duties fo the MCO and MCPO may be clearly distinct and separate, overlapping, or exactly the same in actual practice. Additionally, the separation or lack of separation of responsibilities may migrate to some natural division as a result of the styles of the leaders.

On the surface it appears that the duties of the MCO-MCPO dual leadership team are all task related duties. However, included in the general responsibilities of coordinating/ monitoring the department workload and ensuring adequate communication and control is the responsibility for the safety and well-being of personnel assigned to the maintenance department and this responsibility must be carried out in accordance with the policies set forth by the CO, XO, and Maintenance Officer.

In summary, each squadron in the Light Attack Community containstwo leadership teams with each team performing the duties associated with the task related and socio-emotional functions. The CO-XO team carries out these duties for the

squadron as whole, while the MCO-MCPO team performs their duties within the maintenance department under the policies and guidelines of the CO and XO.

B. READINESS

The Naval Aviation Maintenance Program, (NAMP), manual defines an aircraft as Operationally Ready, (OR), when that aircraft is "safely flyable and capable of performing one or more (but not necessarily all) of the primary missions of the unit to which assigned." The aircraft must have ready, mission essential subsystems necessary for the performance of one or more of the primary missions. Primary mission is defined as any basic mission(s) assigned by a Military Service to the operational unit possessing the aircraft [OPNAVINST 4790.6E].

When an aircraft is not capable of safely performing a minimum of one of the primary missions of the unit to which assigned it is defined as NOT Operationally Ready, (NOR). There exist several reasons for a NOR status. These include NOR aircraft status over which organizational maintenance activity has some control; Not Operationally Ready Maintenance, (NORM), NORM scheduled, NORM(S), and NORM unscheduled, NORM (U). NORM is an aircraft status that indicates the aircraft is unavailable for, or incapable of maintenance. This condition can be caused by a time lag in retrieving the necessary support equipment, such as a stand to reach the vertical stabilizer, the lack of available maintenance personnel required for repair, or the

lack of available Quality Assurance inspectors necessary to complete the maintenance action. An aircraft can also be NOR due to a supply requirement over which the squadron maintenance has no control.

Several of the situations arising which cause excessive NORM time are contollable by the squadron. A squadron which exhibits a high rate NORM should not necessarily be considered to be less effective than a squadron which demonstrates a lower rate, however, a consistently excessive rate of NORM aircraft is undesirable and probably could be reduced by better scheduling, improved training, and better anticipation.

Another statistic utilized to describe a squadron's ability to perform assigned missions, in terms of aircraft readiness is Full Systems Capable, (FSC). To be FSC an aircraft must be capable of performing all assigned missions. If an aircraft is not in an FSC status, it is described as being in a Reduced Material Condition, (RMC). It should be noted that although an aircraft may be RMC it may still be OR if it can perform at least one primary mission safely.

Reasons for an aircraft to be RMC are, as with NOR, separated into maintenance and supply. Supply, or RMCS, is generally out of the control of the squadron. Similar to NORM(S) and NORM(U), RMC can be further separated into Reduced Material Condition due to scheduled maintenance, (RMCM-S), and due to unscheduled maintenance, (RMCM-U).

Excessive rates of RMCM, while not necessarily the fault of squadron maintenance procedures or policies, generally can be improved by such actions as increased emphasis and use of the

proper test equipment, strict adherence to repair or prevention guidelines, such as corrosion control procedures, and improved training, either formal or on-the-job, of maintenance personnel.

Operationally Ready and Full Systems Capable are the primary statistics for gauging the condition of the squadron's aircraft. Aircraft Material Readiness, while necessarily dependent on the condition of the aircraft, entails more than just flyable and mission capable aircraft. The manner in which the aircraft are utilized and the procedures for repair are important parameters in addition to OR and FSC.

Squadron's whose primary emphasis is on amassing record numbers of flight hours can only do so by maintaining a high percentage of OR aircraft. One way to maintain a high OR rate is to cut NORS time by utilizing one or two aircraft as "parts birds" and flying the OR "birds" a disproportionate amount of time. Aircraft reporting procedures prohibit the indescriminate cannibalization of down aircraft to maintain a high OR rate, however, consistently high cannibalization rates indicate either the squadron's policy is toward maintaining artificially high OR and FSC statistics, or a very unusual situation.

Statistics which describe a squadron's performance of requied maintenance deal with the man-hours expended and the number of aircraft parts that were needlessly removed and replaced.

A squadron that expends an inordinate amount of time on required maintenance in proportion to the number of flight

hours during the period can be assumed to be experiencing one of three situations:

(1) The required maintenance during the period has been on particularly time consuming items.

(2) The work centers are over-cautious and send excessive personnel to accomplish the tasks.

(3) The level of expertise of the maintenance personnel performing the repair has been degraded by improper training or inexperience, requiring duplication of effort.

A reported statistic which indicates a general lack of expertise or improper maintenance procedures is the "No Defect" or "A799" rate. The A799 rate is the number of parts which the organizational maintenance activity removed from the aircraft, having diagnosed a failure, and inducted into the supporting intermediate maintenance facility for which no failure, or no defect existed. This condition indicates that either the squadron maintenance personnel incorrectly diagnosed a defect or correctly diagnosed a defect given improper use of test equipment.

Aircraft Material Readiness for purposes of this study was not simply considered to be the OR and FSC rates exhibited by the squadrons, but, was also considered to be the readiness of the aircraft with respect to the man-hours expended in repair and the procedures employed to achieve OR and FSC.

III. REVIEW OF THE LITERATURE

A. DEVELOPMENT OF LEADERSHIP THEORIES

Leadership prior to the nineteenth century was left chiefly to those fortunate enough to have been born into an aristocratic family or those superior in intellect, physical characteristics, or talent. With the social upheavals in America and France more and more previously thought of as common men began to affect their environment. Leaders emerged from every walk of life and the study to identify leadership qualities began.

1. Great Man Theories

Early theorists of leadership explained the emergence of superior men on the survival of the fittest and their intermarriages which produced an aristocratic class biologically different from the lower classes [Wiggam, 1931]. As times of war and strife became more frequent in the early 1900's, leaders began to emerge that were seemingly endowed with unique qualities that captured the imagination of the masses. Dowd maintained that "there is no such thing as leadership by the masses. The individuals in every society possess different degrees of intelligence, energy and moral force, and in whatever direction the masses may be influenced to go, they are always led by the superior few "[Dowd, 1936].

2. Trait Theories

The most obvious traits which set apart one man from another, regardless of position were personality and character. These obvious traits were looked to to provide that combination which enabled an individual to get others to accomplish a given task.

Bernard defined a leader as "any person who is more than ordinarily efficient in carrying psycho-social stimuli to others and is thus effective in conditioning collective responses." The abilities he identified as part and parcel of leadership were sympathy, justice, and humanity, insight, honesty and good faith, courage and patience [Bernard, 1926].

Alternatives to the concept that a leader was necessarily endowed with specific abilities were the environmental theories.

3. Environmental Theories

The environmental theorists proposed that the emergence of a leader is a function of the time, place, and circumstance. Under this concept a leader need not possess a standard set of abilities which enable him to solve the particular problems of the times.

Bogardus presented the idea that the leadership a group will accept depends upon the nature of the problem it must solve. [Bogardus, 1918]. Schneider observed that the number of great military leaders in England was proportional to the number of conflicts in which the nation engaged. [Schneider,1937].

Some theorists of environemntal leadership went even farther to explain leadership in terms of the situation. Hook proposed that the greater the task, the greater the need, the greater must be the ability of the problem-solver. Who that problem-solver turned out to be was irrelevant [Hook, 1943].

The extreme position adopted by Hook was of course not supported in every case. There were certain restrictions society placed on positions of leadership, and certain limitations in positions that required a particular skill. For instance, it was hard to imagine that a member of the Nazi Party could be elected president of the United States, or that a physically disabled aviator might possibly have been pilot-in-command of a commerical air carrier in the time of Hook's postulations. However, some credence was lent to the environmental theories in that within a range of traits or qualifications a wide variety of possible leaders could emerge.

The extreme positions of both the trait theorists and environmental theorists led others to postulate that leadership cannot be explained as the effect of the individual alone; situational factors had to be accounted for.

4. Personal - Situational Theories

Two early proponents of personal-situational theories of leadership were Westburgh and Case.

Westburgh suggested that the study of leadership must include the traits of the individual as well as the specific conditions of the situation. [Westburgh, 1931].

Case identified three factors that produce leadership: the personality traits of the leader, the nature of the group, and the problem confronting the leader and the group [Case, 1933].

Research and theory somewhat lagged these early suggestions. After World War II the earlier points of view were expanded and studies of the variations of leader behavior ensued.

Research on the behavior of leaders led to some complicated results. Hemphill found that some types of behavior are expected of leaders in all situations, and other leader behaviors are more specific to particular types of situations [Hemphill, 1950].

Stogdill's study of transferred executives indicated that some of the behavior of the transferee in new situations is characteristic of himself rather than the position [Stogdill, 1951].

These studies led to the conclusion that some leader behavior was dependent more on the situation, while other leader behavior was a function of individual difference. Further, Sterling discovered that both leaders and followers altered behaviors with different phases of the group process [Sterling, 1950]. Leadership behavior was not found to be a function of traits, of situation exclusively, nor was it found to be static across the group process.

These results brought about a realignment in thinking of the leadership process, and Shartle and Stogdill proposed studying leadership in terms of the status, interactions,

perceptions, and behavior of individuals in relation to other members of the organized group [Stogdill, 1955].

At this point in the development of leadership theory all the variables that characterize modern theories had been identified. Trait theorists identified leader qualities. Environmental theorists identified situational demands. Personal-Situational theories evolved into leader-group interaction theories.

B. CONTEMPORARY POSITIONS

After the initial surge in leadership studies following World War II, leadership theory shifted toward a broader frame of reference. Methods and studies to include the variables of leadership previously identified settled down into three general schools of thought centered at three major universities.

The Ohio State University studies concentrated on description of the behaviors of leaders in formal organizations, and sought to relate their leadership behavior to both subjective and objective criteria of group satisfaction and group performance.

The University of Michigan studies, on the other hand, started with an initial focus on productivity and group morale, with a view toward identifying supervisory behaviors that are facilitative not only of productivity, but also of high morale and satisfaction.

The studies initiated by Fiedler at the University of Illinois concentrated on the personal need strucuture of the leader and the interaction between him and the group, leading

toward group effectiveness. In most cases, these studies were characterized by an attempt to use an objective, concrete criterion of group productivity as a standard by which to measure effectiveness of the leader [Jacobs, 1970].

1. Ohio State Studies

At Ohio State the decision to devote the majority of attention to the development of concepts about leadership, and to development of a methodology for studying leadership led to identification of such variables for study as status, work performance, personal interactions, responsibility, authority and personal behavior patterns [Stogdill, 1957].

In studying the leader and his behavior, the focus on the actions of the leader led to the paradigm for the study of leadership developed by Stogdill which showed the organizational influences on the leader's behavior. This orientation led to the definition of a leader as an individual in a given office or position of apparently high influence potential [Shartle, 1963].

Since the early work was done in formal organizations it was quite natural that behavior, or leadership functions, would separate into those functions that varied with the leader and those that were constant with the position. Formal organizations are goal-oriented and the definization of goals and objectives led to structured functions for a given position.

The need to obtain descriptions of leader behavior that might be classified into more general categories resulted in identification of nine different dimensions of leader behaviors:

1. Integration
2. Communication
3. Production emphasis

4. Representation

5. Fraternization

6. Organization

7. Evaluation

8. Initiation

9. Domination

Factor analysis of the responses to a questionnaire developed from these categories and administered to many organizational groups resulted in identification of the two most improtant; Consideration and Structure [Halpin, 1957].

Consideration reflects the extent to which an individual is likely to have job relationships characterized by mutual trust, respect for their ideas, consideration of their feelings, and a certain warmth between himself and them. A high score is indicative of a climate of good rapport and two-way communication. A low score indicates the indivdual is likely to be more impersonal in his relations with group members.

Structure reflects the extent to which an individual is likely to define and structure his own role and those of his subordinates toward goal attainment. A high score on this dimension characterizes individuals who play a very active role in directing group activities through planning, communicating information, scheduling, criticizing, trying out new ideas, and so forth. A low score characterizes individuals who are likely to be relatively inactive in giving direction in these ways [Fleishman, 1969].

The importance of consideration and initiating structure as independent variables in formal organizations is reflected in the need for the leader to be flexible and to balance his behavior to obtain the right balance of output from his group. The effective leader has been described as the leader who engages in both kinds of behavior, in the proper amount, rather than avoiding one type or the other [Rim, 1965]. This idea led to the application of the two dimensions of military leadership, called the Managerial Grid [Blake and Mouton, 1965].

With the Managerial Grid a leader's behavior can be scored in terms of his emphasis on mission performance and his concern for his people. The Grid reflects the fact that concern for people is not incompatible with a concern for mission performance.

2. University of Illinois Studies

The studies initiated by Fiedler at the University of Illinois concentrated on the personal need structure of the leader and the interaction between him and the group, leading toward group effectiveness.

Group effectiveness in interacting groups, the primary focus of the studies at the University of Illinois, was postulated to be a result of the interaction between the leader and the group. Assuming that both the leader and the group possessed the requisite skills, resources, and abilities to accomplish the task there appeared to be three major dimensions which determined the degree to which the leader had influence

in his group; leader position-power, the structure of the task, and the interpersonal relationships between leader and members [Fiedler, 1967].

Allowing these dimensions to vary created different degrees of situational favorableness for the leader. Group effectiveness then became a function of the leader's style and the situational favorableness he faced.

Position power reflects the degree to which the position itself enables the leader to get his group members to comply with and accept his direction and leadership. This power is construed to mean legitimate and reward-and-punishment power similar to that described by French and Raven [French, 1959]. Position power therefore is the potential power which the organization provided for the leader's use [Fiedler, 1967].

A leader who enjoys high position power is not necessarily expected to get unprecedented performance from his group, but it is certainly true that a leader with low position power is at a disadvantage. The leader with low position power must first convince the group to follow his direction and be continually aware that his role as leader is tenuous and highly dependent upon his personal relations with individuals in his group.

Task structure is another important element of situational favorableness for the leader. The task constitutes the reason for establishing the group in the first place, in most cases, and the group's existence depends on satisfactory performance of the task. Groups which are subunits of a larger

organization are assigned a task and usually structure is provided in the form of directives or constraints.

The nature of the task determines the leader's influence to a considerable extent. The structured task, is, in effect, one way of influencing member behavior by means of the organizational sanctions which can be imposed, and it reinforces position power. The leader of a group which engages in a highly unstructured task cannot use his own position power or the power of the organization because the task dilutes his influence [Fiedler, 1967].

Interpersonal relations between the leader and the group is largely determined by the personalities of the leader and the group member, unlike position power and task structure which are more determined by the organization. Good interpersonal relations enables the leader to more effectively direct the actions of the group, while, with poor interpersonal relations, the leader may have to rely on position power granted him by the organization.

Across the spectrum of situational favorableness one other variable is hypothesized by Fiedler to be a determinant of group effectiveness - leadership style. Leadership style and leader behavior are two separate and distinct functions in this theory. Leader behavior is the composite of the particular acts engaged in by the leader to ensure task accomplishment or strengthen leader-members relations.

Leadership style is a function of the underlying need structure of the leader. Although leadership style is thought to be determined by personality, repeated efforts to

correlate the two have failed [Fiedler, 1971].

Leadership style is measured by asking the leader to describe his least preferred co-worker, (LPC). If the leader describes the LPC in negative and rejecting terms he is presumed to place more importance on the task than on interpersonal relationships. Conversely, if the leader describes the LPC in accepting and favorable terms he is presumed to be more relationship oriented.

Leadership style is thought to be a fairly constant measure across all situations and is the chief determinant of leader behavior although certain situations cause leaders to behave seemingly inconsistently with their primary needs [Sample and Wilson, 1965]. Fiedler explains this phenomenon in terms of secondary needs [Fiedler, 1970].

Group effectiveness was the primary goal of the University of Illinois studies. With leadership style a static variable, Fiedler suggested matching situational favorableness with the style of the leader. Position power, task structure, and leader-member relations were the variables all under the control, to a large extent, of the organization. Leader-member relations was the variable not under direct control, but could be varied by selecting the appropriate composition for the leader.

C. REPRESENTATIVE STUDIES

Regardless of the approach to the derminants of leadership, the ultimate test of leadership is group effectiveness. Unfortunately, group effectiveness measurement requires a lengthy research and is hampered by turnover of personnel. Most

research, therefore, has been conducted on leadership effectiveness, or more precisely, the effects of leadership upon the group.

1. Consideration and Structure

The two most important dimensions of supervisory behavior identified by the Ohio State Leadership Studies were; consideration and initiating structure. Two methods exist for measuring a leader's behavior in terms of consideration and initiating structure. The first method is to have the leader describe the actions he feels he should take. The second method is to have the group members describe the behaviors actually exhibited.

Halpin found that the description, by leaders, of how they ought to behave, "does not correspond closely" with actual behavior as perceived by subordinates [Halpin, 1955]. Additionally, self-descriptions of consideration and structure were not found to be significantly related to effectiveness [Hemphill and Coons, 1957]. Description made by subordinates in the study were positively related to ratings of unit effectiveness.

The leader's description of his attitude toward consideration and structure can, however, be thought of as a description of his leadership style and, as such, has some effect on his behavior.

Studies which used the leader's self-description of consideration and structure, while not extensive, have yielded interesting results. Bass found, in a study for predicting success in a large food-products corporation,

that correlations after three years between performance ratings and structure and consideration were .05 and .32 respectively. In this study a man was rated high if, "since he has taken over the job, his subordinates are showing signs of doing a better job, getting more done, staying on the job, exhibiting more satisfaction, and selling more." Performance ratings were obtained once again five years after the original administration and the consideration scale still had a validity of .37. Ratings included strong emphasis on the supervisor's ability to develop subordinate's performance, growth, and satisfaction [Bass, 1958].

In another study, Parker found that consideration was strongly related to "favorable attitudes towards supervision" (r=.51), to "group feelings of goal achievement" (r=.24), and to the recognition that workers felt they received for good performance (r=.45). Structure was significantly related to favorable attitudes toward supervision (r=.22) and to pricing errors (r=.23). Productivity did not correlate significantly with either scale [Parker, 1963].

Perhaps the most strikingly successful study of the leader's self-description and effectiveness was conducted by Fleishman and Ko. In an large shoe manufacturing company 88 department managers described themselves in terms of consideration and structure, and at the same time were individually rated on overall proficiency by a management team The correlation between self-description scores and management team ratings was .50 for structure and .30 for consideration.

When the managers were grouped into ranks, the correlation with the proficiency ratings was .61 for structure and .43 for consideration [Fleishman and Ko, 1962].

While many significant validities have been obtained utilizing the self-description of the leaders with effectiveness criteria, the pattern is not universal. It should be noted however, that no cases were found where low consideration goes with good performance. Thus, low consideration scores are more indicative of an undesirable situation. The results with structure depend more on the situation.

In general, the pattern that emerges as most undesirable for many situations is the one in which supervisors are low in both consideration and structure. The high structure-low consideration supervisor is more likely to show more turn-over, grievances, and stress among his subordinates. There is also evidence that managers high in consideration can be higher in structure without these adverse effects [Fleishman and Harris, 1962]. For many criteria and situations, the above-average structure and consideration pattern seems most likely to optimize a variety of different effectiveness criteria [Fleishman, 1969].

2. <u>Least Preferred Co-worker</u>

The Contingency Theory of Leadership Effectiveness establishes a spectrum of situational favorableness for the leader based on three dimensions - leader position power, degree of task structure, and leader-member relations; the most important situational favorableness dimension [Fiedler, 1971].

In a study of B-29 bomber crews, two criterion were used and leader-member relations were manipulated such that the military commander was the sociometrically preferred crew member and either endorsed or rejected the key man. When the keyman was the radar observer or navigator and the leader endorsed him, the task-oriented led teams scored higher on radar bomb score circular error average. When the keyman was rejected, the relationship oriented led teams scored higher. [Fiedler, 1955].

Another study conducted on Anti-aircraft Artillery crews varied leader-member relations by examining crews whose leader was either the most-preferred crew member, or among the ten least-preferred crew members. The criterion was the location and acquisition of unidenitified aircraft. When the leader was the most-preferred crew member, task-oriented led teams out performed teams led by relationship oriented leaders. When the leader was among the ten least-preferred crew members, the relationship oriented leader's teams were more effective. [Hutchins and Fiedler, 1960].

The particular behavior of leaders, whether task or relationship oriented, in the various situations is somewhat explanatory of the phenomenon exhibited. Task oriented leaders tend to be more effective in situations of high favorableness or very poor favorableness, whereas relationship oriented leaders tend to be more effective in situations of moderate favorableness. Table 3-1 presents the median correlations between leader LPC and group performance in various octants for the studies conducted on the Contingency Model.

TABLE 3-1

MEDIAN CORRELATIONS BETWEEN LEADER LPC AND GROUP PERFORMANCE

OCTANT	LEADER MEMBER RELATIONS	TASK STRUCTURE	POSITION POWER	MEDIAN CORRELATION	NUMBER
I	GOOD	STRUCTURED	STRONG	-.52	8
II	GOOD	STRUCTURED	WEAK	-.58	3
III	GOOD	UNSTRUCTURED	STRONG	-.33	12
IV	GOOD	UNSTRUCTUED	WEAK	.47	10
V	MOD.POOR	STRUCTURED	STRONG	.42	6
VI	MOD.POOR	STRUCTURED	WEAK		0
VII	MOD.POOR	UNSTRUCTURED	STRONG	.05	12
VIII	MOD.POOR	UNSTRUCTURED	WEAK	-.43	13

[Fiedler,1967].

D. CO-MANAGER CONCEPT

The majority of leadership theory and leadership studies have been devoted to the concept of a single leader in the group. In practice, however, many organizations, such as the military, employ two leaders to perform the duties required for group or unit effectiveness.

Whether the organization structures the task and the positions to accomodate two leaders or allows the natural evolution of the task to require dual leaders, organizations under the Co-manager concept tend to divide the leadership functions. One member acts as the task leader and the other acts as the socio-emotional leader. Research by Bales indicates that this is the most spontaneous and natural arrangement to occur [Bales, 1958].

The task leader responds to the task-related demands placed upon the organization such as unit effectiveness. Conversely, the socio-emotional leader discharges the duties associated with socio-emotional demands, such as maintaining subordinate satisfaction. Frequently, task-related demands and socio-emotioanl demands are incompatible and a compromise must be reached.

The type of compromise that is effected depends in large part upon the relative positions of the members of the dual leadership team. In the military, for instance, the commanding officer, (CO), is generally charged with responsibilities of the socio-emotional leader but must also be concerned

with efficiency. The executive officer, (XO), is generally responsible for the task-related duties. The attitude of the unit toward the task is established by the CO but may be carried by the XO.

In actual practice the military does not always divide the responsibilities as described above. The XO is generally forced to assume the role the CO delegates to him and may not always be assumed to be the task-related leader.

A survey of naval officers conducted by Senger found that in 60 percent of the commands the naval officers had served in, the task and social functions were divided between the CO and XO. Within this 60 percent, the CO assumed the social role 37 percent of the time with the XO performing the task role. In the remaining 23 percent, the roles were reversed. In the 40 percent of the situations where the functions were not divided, both the CO and XO assumed the social role in 9 percent, and in 19 percent the CO assumed both roles [Senger, 1971].

No single study was discovered that linked the Co-manager concept of leadership with group effectivenss by comparing the match or mismatch of leadership styles to concrete criterion of effectiveness.

IV. PURPOSE

Within the Naval Aviation Community, aircraft material readiness is maintained at a high level by emphasizing individual readiness parameters such as operationally ready (OR), and full systems capability (FSC). Under conditions of limited assets and long procurement pipeline times, maintenance of OR and FSC at specified levels is frequently accomplished by tradeoffs of manhours and established maintenance procedures.

An example of this condition is the commonly accepted practice of removal of "black boxes" which are carried to supply's rotable pool, exchanged without paperwork, and replaced with new "black boxes" in order to make launch. Too often the problem was not with the "black box" in the first place but with the aircraft itself. In this type of situation assets are wasted, innumerable manhours are needlessly expended, and testing of the entire system must still be accomplished. Adherence to Naval Aviation Maintenance Program, NAMP, guidelines may or may not prevent lost sorties in the short run, but certainly would tend to minimize wasted assets and effort.

Policies and procedures under which naval aviation squadrons operate emanate from two sources. First, published procedures, guidelines, and directives outline the the manner in which operations, both flight and maintenance, are to be conducted. Second, the emphasis that squadrons place on the operations of the unit and the maintenance effort establishes the degree of adherence or departure from the directives.

The intent of this thesis is to demonstrate that the emphasis that four key leaders in naval aviation squadrons place on activities to maintain a high degree of aircraft material readiness is a significant variable in the level of readiness exhibited.

Additionally, the intent is to measure the relationship between emphasis on the activities necessary for efficient operations, represented as leadership style, and the level of aircraft material readiness exhibited.

Finally, the intent of this thesis is to demonstrate that by collating the individual readiness parameters currently collected into descriptive factors, tradeoffs among factors of aircraft material readiness can be examined and measured.

V. METHOD

A. SAMPLE CHARACTERISTICS

The sample in this study consisted of 24 squadrons whose mission was to fly and maintain the A7E aircraft. Of these 24 squadrons, 19 provided data for this study.

No attempt was made to separate deployed from non-deployed squadrons although several squadrons were deployed during the period for which the readiness data was collected.

Leaders in the four key positions within each squadron were required to have served in their respective billets during the full six-month period for which readiness data for the unit was collected.

No attempt was made to identify leader rank, age, experience, level of education, behavior, or personality characteristics.

B. INSTRUMENTS

Leadership style for each of the leaders participating in the survey was identified using Fleishman's Leadership Opinion Questionnaire (LOQ), and Fiedler's Least Preferred Co-worker Scale (LPC).

The leaders were asked to describe how they felt they *ought* to act on each of the situations described by the LOQ. The LOQ provided measures of the leader's style on the two dimensions of supervisory leadership identified by the Ohio State Leadership Studies as meaningful in a wide variety of supervisory - subordinate situations: Consideration and Structure.

The leaders were additionally asked to describe their least preferred co-worker on the LPC. The LPC provided a measure of the leader's underlying need-structure, which Fiedler uses to describe a leader's style. From the LPC, a leader was identified to be task-, independence-, or relationship-oriented. If a leader described his least preferred co-worker in very negative or rejecting terms he was identified as task-oriented. If the leader could distinguish his least preferred co-worker in rather more positive terms he was identified as relationship-oriented. Those leaders who did not distinguish their least preferred co-workers as either all bad or possessing good qualities, in spite of the leader's inability to work well with them, Fiedler has identified as being independence-oriented.

C. CRITERIA

Sixteen separate readiness variables were collected for each squadron over a six month period in which as many as possible of the key leaders were attached to and discharging their respective duties in the unit.

To better identify an overall description of the unit's performance in aircraft material readiness, the readiness variables were grouped by factor analysis into five descriptive factors.

Readiness can be categorized many ways to specifically relate it to a particular condition or ability. However, in order to examine the relationship between leadership style and the parameters of readiness which might be affected by leadership style a bridge was sought to relate the generally accepted

variables of readiness within the aviation community with composite indices of conditions or activities which are easily identified as affected by leadership.

Accordingly aircraft material readiness for purposes of this study was not considered to be simply material, operational equipment, combat, personnel, or mobilization readiness. Instead, aircraft material readiness was re-defined to include descriptive factors from the areas of equipment, operations, personnel, mission, and material readiness.

This was accomplish by means of factor analysis of the variables listed in Appendix A. Since some of the variables had extremely high correlations or were in fact identity relationships, the variable list was condensed to those linearly independent variables which were thought to have a relationship with leadership style yet still were descriptive of aircraft material readiness. Specifically, the variables which were not considered in the factor analysis were: Total percent NORS, Total percent NORM(U), Total percent RMCS, and Total percent RMCM(U). Aircraft downtime due to supply and unscheduled maintenance was considered to be generally unpredictable or uncontrollable by the squadrons.

Factor analysis was performed on the remaining variable to provide variable groupings and weights which would be indicative of the facets of readiness. The analysis produced five factors with factor loadings, or weights, for each of the twelve readiness variables. To identify and label the five factors,

it was necessary to consider only the major variables in each factor. This was accomplished by limiting the variables in each factor to those whose factor weight was greater than .3 or less than -.3. The resultant factors were then labelled according to the significant variables in each. TABLE 5-1.

Aircraft material readiness was determined to include Aircraft Availability, or equipment readiness; Flight Operations, or operational readiness; Manpower Utilization, or personnel readiness; Mission Capability, or mission readiness; and Maintenance Procedures. Altnough the last factor, Maintenance Procedures, has not been specifically defined as a type of readiness, it contributes significantly to each of the other factors and, indeed, to each of the variables of readiness.

Factor scores were computed for each of the 24 squadrons. For squadrons with missing data in the variables, the mean of all other squadron data was substituted. Only three variables were affected by missing data: RMCM, with only two squadrons' data missing, CANN with only three squadrons' data missing, and A799 with eight squadrons' data missing.

Ratios were used in calculating the readiness variables to reduce the impact of deployments, varying numbers of aircraft assigned, and unusual operational committments.

TABLE 5-1

FACTORS OF AIRCRAFT MATERIAL READINESS

FACTOR 1 — AIRCRAFT AVAILABILTY

EIGENVALUE = 2.87 — PCT OF VAR = 23.9

WEIGHTING		VARIABLES	
.88144	X	OR	$= \frac{\text{HRS RRS - HRS NORS - HRS NORM}}{\text{HRS RRS}}$
.85097	X	FSC	$= \frac{\text{HRS RRS - HRS NORS - HRS NORM - HRS RMCS - HRS RMCM}}{\text{HRS RRS}}$
-.71381	X	NORM	$= \frac{\text{HRS NORM(S \& U)}}{\text{HRS RRS}}$
-.39527	X	A799	$= \frac{\text{NO. ITEMS NO DEFECT}}{\text{NO. ITEMS PROC. BY AIMD}}$
-.43973	X	RMCM	$= \frac{\text{HRS RMCM (S \& U)}}{\text{HRS RRS}}$

FACTOR 2 — FLIGHT OPERATIONS

EIGENVALUE = 2.47 — PCT of VAR = 20.6

WEIGHTING		VARIABLES	
.98226	X	HRS	$= \frac{\text{FLIGHT HRS}}{\text{AVG NO. ACFT}}$
.87877	X	FLTS	$= \frac{\text{FLIGHTS}}{\text{AVG NO. ACFT}}$
-.38560	X	CANN	$= \frac{\text{CANNIBALIZATIONS}}{\text{FLT HRS}}$

FACTOR 3 — MANPOWER UTILIZATION

EIGENVALUE = 1.85 — PCT of VAR = 20.6

WEIGHTING		VARIABLES	
.89465	X	(I)MMH	$= \frac{\text{MMH(NOT SQD)}}{\text{FLT HRS}}$
.82910	X	DMMH	$= \frac{\text{MMH SQD}}{\text{FLT HRS}}$
-.34748	X	RMCM	$= \frac{\text{HRS RMCM (S \& U)}}{\text{HRS RRS}}$

		FACTOR 4	MISSION CAPABILITY
		EIGENVALUE = 1.39	PCT of VAR = 11.6
WEIGHTING		VARIABLES	
.66548	X	AVG A/C	= $\frac{\text{HRS RRS}}{\text{HRS PERIOD}}$
-.61335	X	RMCM	= $\frac{\text{HRS RMCM (S \& U)}}{\text{HHRS RRS}}$

		FACTOR 5	MAINTENANCE PROCEDURES
		EIGENVALUE = 1.18	PCT of VAR = 9.8
WEIGHTING		VARIABLES	
.72526	X	AWM NORM	= $\frac{\text{HRS AWM}}{\text{HRS RRS}}$
.38402	X	NORM	= $\frac{\text{HRS NORM (S \& U)}}{\text{HRS RRS}}$
.41875	X	CANN	= $\frac{\text{CANNIBALIZATIONS}}{\text{FLT HRS}}$

D. STATISTICAL ANALYSIS

Statistical analysis of the instrument and criterion data was accomplished with the aid of the Statistical Package For the Social Sciences (SPSS).

Factors for aircraft material readiness were computed by means of factor analysis. Factor analysis in this study as was noted earlier was employed to explore and detect patterning of the readiness variables with a view to new insights on readiness concepts more descriptive of the broad and general category of aircraft material readiness. Additionally, the factor analysis method was utilized to gain a reduction of data and construction of indices to be used as new variables in analysis with the leadership data.

The three steps associated with the factor analysis were: (1) preparation of the correlation matrix, (2) extraction of the initial factors, and (3) rotation to a terminal solution. In this study R factor analysis was performed based on correlations between the variables of the readiness data.

The initial factors which were extracted became a new set of variables computed on the basis of the inter-relationships exhibited in the data. The new variables were defined as exact mathematical transformations of the original data. This was accomplished by principal-component analysis which transformed the readiness variables into a new set of composite variables that were uncorrelated (orthogonal) to each other.

These principal components represented the best linear combination of variables that would account for more of the variance in the data as a whole than any other linear combination of variables.

The first principal-component, therefore, was viewed as the single best summary of linear relationships exhibited in the data. The second component was defined as the second best combination of variables, under the condition that the second component was orthogonal to the first. The second and succeeding components were therefore, defined as the linear combinations of variables that accounted for the most residual variance after the effect of the first component was removed from the data.

The principal component model utilized was:

$$z_j = a_{j1}F_1 + a_{j2}F_2 + \dots + a_{jn}F_n$$

where:

z_j = variable j in standardized form

F_i = uncorrelated components (factors)

a_{ji} = standardized multiple-regression coefficient of j on factor i extraction

Following extraction of the initial factors, the matrix constructed was rotated to an orthogonal terminal solution matrix in which all factors were uncorrelated. In this type of solution, the coefficients of the variables within each factor represented both regression weights and correlation coefficients. The higher the coefficient of a variable within a factor the more important that variable was to the factor.

These "most important" variables were then used to label the factors.

Selection of the number of factors used to describe aircraft material readiness was based on the cumulative percentage of variance explained by the factors. The sum of the percentage of variance explained by all of the factors included in the terminal solution had to be greater than .8.

Relationships between leadership style and the criterion variables, the computed factors, were tested by means of three members of the closely related family of multi-variate statistical techniques: bivariate correlation, and canonical correlation, and multiple regression.

Bivariate correlation provides a measure of the extent of the linear relationship between a single predictor and a single criterion variable. Pearson's product-moment correlation coefficients were computed for each possible combination of leadership style and the variables of readiness, as well as for the constructed factors. The product-moment correlation coefficients measured the degree of linear association in the combinations and each was then individually tested for statistical significance.

Multiple regression analysis derives a linear relationship between a single criterion variable and two or more predictor variables. Multiple regression provides five values of importance to the researcher. The first value, multiple R, indicates the degree of correlation between the criterion

variable and the linear combination of predictor variables. The second value, B, indicates the appropriate coefficient for each of the predictor variables in the linear regression equation. The third value, β, has the same role as B when all the measurements are standardized. Both B and β are proportional to the correlation between the criterion variable and each of the predictor variables, with all other criterion variables partialled out (held constant). The fourth value, C, is the intercept constant in the regression equation for unstandardized measurements. The final value, F, is a ratio which allows the statistical significance of the multiple R and B or β values to be determined.

The multiple regression was performed stepwise where the predictor variables were entered into the equation on the basis of their partial correlation with the criterion variable. In the first step the predictor variable with the highest absolute value simple correlation coeficient was entered from the list of independent, or predictor variables. The values B, C, β, multiple R and F were computed to allow the investigator to cut-off the regression or continue by entering the next predictor variable.

Multiple regression was performed on the readiness variables and factors for each dual leadership team separately by introducing the leadership style variables into the regression equations in a step-wise fashion. A general form of the multiple regression model is specified by:

$$y_i = \beta_1 X_{i1} + \beta_2 x_{i2} + \dots \beta_n X_{in} + e_i$$

for L = 1,2, ...n

where:

Y_i = Value of the dependent (or criterion) variable for the ith leadership team.

β_k = Weightings for predictor variables.

e_i = Random error term for the ith leadership team.

Canonical correlation, a statistical technique similar in many respects to both multiple regression and factor analysis, derives a linear combination for two sets of variables in such a way as to maximize the correlation between between the two linear combinations termed canonical variates. The square of the amount of correlation between each pair of canonical variates is termed the eigenvalue. This value represents the amount of variance in one canonical variate which is accounted for by the other canonical variate. In this study, CL, CT, CS, XL, XT, and XS taken two at a time and varied to form all possible combinations represented one set of input variables. ML, MT, MS, PL, PT, and PS were combined in a manner similar to CL to XT and formed the other set of input variables. The factors computed for each squadron were grouped in the following manner: Factor 1, Factor 2; Factor 1, Factor 4; Factor 2, Factor 4; Factor 3, Factor 5. These combinations of factors formed the criterion set of input variables in the generalized formula:

$$\sigma_1 c_1 + d_2 c_2 = \beta_1 P_1 + \beta_2 P_2$$

where:

α_n = Weighting for the nth factor variable (n=1,2).

β_m = Weighting for the mth leadership-style variable (m=1,2).

C_n = Criterion variable n (n=Factors 1-5).

P_m = Predictor variable m (M=CL, CT, ...).

VI. RESULTS

The restrictions placed upon the sample at the outset that the leaders must have served in their respective billets for at least six months to be compared with the readiness data for that period reduced the number of dual leadership teams to nine cases of Commanding and Executive Officers and nine cases of Maintenance Control and Maintenance Chief Petty Officers.

A. LEADERSHIP STYLE

Mean scores for leaders in the sample were computed on each of the leadership questionnaires. CS, CT, XS, XT, MS, MT, PS, and PT were computed from the leader's scores on the Leadership Opinion Questionnaire (LOQ), reflecting the leaders' emphasis on the dimensions of supervisory behavior; consideration and structure, (TABLE 6-1). These scores were then compared with normative LOQ data, (TABLE 6-2).

The means obtained on the perceived roles of leaders demonstrated that leadership teams of CO's and XO's placed more emphasis on the social role than the task role. Conversely, the MCO-MCPO leadership teams tended to place more emphasis on the task role than on the social role.

Within each team, the XO's as a group tended to place more emphasis on the consideration dimension than did the CO's. Additionally, the XO's tended to place more emphasis on the structure dimension than did the CO's.

For the MCO-MCPO dual leadership teams, the MCO's placed more emphasis on the consideration dimension, while the MCPO's placed more emphasis on the structure dimensions.

Mean scores for the leaders on the Least Preferred Co-Worker Scale (LPC) are intended to reflect the underlying need structures of the leaders. CL, XL, ML, and PL were computed with CL (4.09), XL (3.92), ML (3.61), and PL (4.62). These scores were compared with data obtained from ten year survey conducted at the Naval Postgraduate School on LPC scores for 601 military officer and Department of Defense employees. The mean score obtained in the Naval Postgraduate School study was 3.75. For this study, CO's and XO's were found to be above the mean. MCO's were found to be below the mean, and MCPO's were found to be a substantial one standard deviation above the mean.

In comparison of the LOQ results with the LPC results, the CO-XO team demonstrated the following expected tendency: the CO's were more relationship-oriented than task-oriented as measured by the LPC, and placed more emphasis on consideration than on structure, as measured by the LOQ. Like the CO's, the XO's were more relationship oriented than task oriented, and placed more emphasis on consideration than initiating structure.

TABLE 6-1

DATA SUMMARY

LEADER	n	MEAN	STD DEV.
CO LPC - CL	9	4.09	.89
CO COM - CS	9	54.11	6.15
CO STRU - CT	9	44.44	6.09
XO LPC - XL	9	3.92	.71
XO CON - XS	9	55.90	6.10
XO STRU - XT	9	47.33	9.57
MCO LCP - ML	9	3.61	.69
MCO CON - MS	9	53.78	7.40
MCO STRU - MT	9	48.22	6.04
MCPO LPC - PL	9	4.62	1.12
MCPO CON - PS	9	49.33	3.81
MCPO STRU - PT	9	50.11	9.25

TABLE 6-2

LOQ ANALYSIS

Normative Data (N=3008)

	%tile	Socio-emotional Score (Consideration)	Task-related Score (Structure)
Very High	99	72	68
	98	69	66
	97	68	64
	95	65	64
	90	62	60
High	85	60	58
	80	59	57
	75	58	55
	69	57	54
	60	55 CS-XS	52
Average	50	53 MS	50 PT
	40	51	49 MT
	31	50 PS	47 XT
	25	48	45
	20	47	44 CT
Low	15	46	42
	10	44	41
	5	42	38
	3	41	36
Very Low	2	40	34
	1	38	31

The MCO-MCPO teams, however, did not demonstrate an emphasis on the socio-emotional or task-related dimensions of the LOQ in consonance with their underlying need structures, as measured by LPC. The MCO's were task oriented rather than relationship oriented but, conversely, placed more emphasis on considerations than on structure. The MCPO's were more relationship oriented than task oriented as measured by the LPC, yet placed more emphasis on structure than on consideration as measured by the LOQ. This schizophrenic appearing result may account for some of the later findings.

B. LEADERSHIP AND READINESS

Bivariate correlation, multiple regression, and canonical correlation analyses were used to discover relationships between leadership style and the computed factors of aircraft material readiness.

Bivariate correlation analysis provided five significant correlations (p=.05), out of 60 possible, between the variables of leadership style and the computed factors of readiness. (TABLE 6-4). Aircraft Availability, factor 1, had significant correlations with the CO's LPC (.77), and the CO's structure, CT (-.70). Manpower Utilization, factor, 3, and a significant negative correlation (-.65) with the MCO's LPC. Maintenance Procedures, factor 5, had significant correlations with the CO's consdieration score (.71) and the XO's structure (-.62). No significant correlations were obtained for Flight Operations and Mission Capability with the variables of leadership style.

Multiple regression of the factors of readiness and leadership style produced only three significant results out of sixty analyses. (TABLE 6-5). Factor 1, Aircraft Availability, was found to be significantly predicted by CT (-.76), and XT (.46), with a multiple R of .84. This result indicates that high Aircraft Availability would tend to be associated with situations where the CO provides less structure and the XO provides more structure.

Maintenance Procedures, factor 5, was found to be significantly predicted by XT (-.55) and CT (-.55), with a multiple R of .83. This result indicates that low Maintenance Procedures tends to be associated with situations where both the XO and CO are high in initiating structure.

Aircraft Availability, factor 1, was found to be significantly predicted by CL (.77), and XL (.31) with a multiple R of .83. This result inciates the more relationship oriented both the CO and XO are, as measured by the LPC, the higher Aircraft Availability tends to be.

No significant results were found for factor 2, Flight Operations, factor 3, Manpower Utilization, or factor 4, Mission Capability. Additionally, no significant results for any factor were obtained for the MCO-MCPO dual leadership teams with multiple regression.

Results with canonical correlation were obtained by varying the readiness factors in groups of two with combinations of leadership style for the dual-leadership teams. (TABLE 6-6). The decreased sample size due to matching up of the leaders with readiness data allowed only four variables in the

TABLE 6-3

BIVARIATE CORRELATION RESULTS

		FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
CO LPC	r=	.77	-.27	-.06	.19	-.42
	sig=	.02	.49	.87	.63	.26
CO CON	r=	-.37	-.37	.52	.33	.71
	sig=	.33	.32	.15	.39	.03
CO STRU	r=	-.70	.46	-.21	-.59	-.29
	sig=	.04	.22	.59	.09	.46
XO LPC	r=	.31	.21	-.17	.03	-.46
	sig=	.25	.44	.53	.91	.07
XO CON	r=	.00	-.15	-.06	-.10	-.04
	sig=	.99	.57	.81	.69	.87
XO STRU	r=	.36	.42	-.02	.09	-.62
	sig=	.16	.09	.93	.75	.008
MCO LPC	r=	-.42	.18	-.65	-.26	-.33
	sig	.17	.57	.022	.41	.29
MCO CON	r=	-.29	.20	-.14	-.32	.13
	sig=	.35	.54	.66	.31	.70
MCO STRU	r=	.51	.16	.01	.29	-.36
	sig=	.09	.63	.97	.36	.25
MCPO LPC	r=	-.30	.46	-.19	-.18	-.15
	sig=	.35	.14	.56	.58	.63
MCPO CON	r=	.18	-.03	-.35	-.08	-.39
	sig=	.58	.92	.27	.81	.21
MCPO STRU	r=	-.13	.05	.20	-.45	-.25
	sig=	.70	.88	.54	.14	.44

TABLE 6-4

SIGNIFICANT RESULTS MULTIPLE REGRESSION

Analysis	Multiple R	F	DF	Significance
1.	.837	7.04	2/6	.05

Variables	Factor 1	CT	XT	
B weights and C		-.32	.17	6.23
Beta weights		-.76	.46	
F		11.51	4.21	
Significance		.01	-	

Analysis	Multiple R	F	DF	Significance
2.	.82620	5.38	2/5	.05

Variables	Factor 1	CL	XL	
B weights and C		2.20	1.099	-12.95
Beta weights		.77	.31	
F		9.265	1.47	
Significance		.05	-	

Analysis	Multiple R	F	DF	Significance
3.	.88	5.77	3/5	.05

Variables	AVG A/C	CT	CS	XT	
B weights and C		-.091	.12	.077	5.72
Beta weights		-.67	.88	.63	
F		9.74	7.96	4.05	
Significance		.05	.05	-	

Analysis	Multiple R	F	DF	Significance
4.	.98	23.61	4/4	.01

Variables	AWM NORM	CT	CS	XS	XT	
B weights and C		-1.17	4.66	2.07	2.19	-379.85
Beta weights		-.41	1.67	1.06	.87	
F		15.20	32.90	27.4	11.5	
Significance		.01	.01	.01	.05	

Analysis	Multiple R	F	DF	Significance
5.	.97	15.51	4/4	.01

Variables	RMCM	CT	CS	XS	XT	
B weights and C		.17	-1.20	-1.397	-.53	161.21
Beta weights		.27	-2.21	-2.33	-1.27	
F		4.48	50.17	43.12	26.20	
Significance		-	.01	.01	.05	

Analysis	Multiple R	F	DF	Significance
6.	.99	46.87	4/4	.01

Variables	FSC	CT	XT	XS	CS	
B weights and C		-2.27	-.72	-1.14	-1.97	357.00
Bets weights		-.999	-.36	-.73	-.88	
F		173.16	3.76	25.01	17.69	
Significance		.01	-	.01	.05	

TABLE 6-4 Cont.

Analysis	Multiple R	F	DF		Significance	
7.	.95	16.27	3/5		.01	
Variables	DMMH	CS	XT	XS		
B weights and C		2.19	1.55	.84		-209.27
Beta weights		2.66	2.07	1.46		
F		48.00	36.83	30.86		
Significance		.01	.01	.01		

Analysis	Multiple R	F	DF	Significance
8.	.94	18.74	2/5	.01
Variables	CANN	CT	XT	
B weights and C		-.49	-.43	57.23
F		16.40	15.95	
Significance		.01	.01	

Analysis	Multiple R	F	DF	Significance
9.	.80	5.31	2/6	.05
Variables	A799	PT	MS	
B weights and C		.18	-.27	11.12
Beta weights		.56	-.56	
F		5.23	5.90	
Significance		.05	.05	

Analysis	Multiple R	F	DF	Significance
10.	.87	9.63	2/6	.05
Variables	CL	CT	CS	
B weights and C		-.10	-8.14	13.16
Beta weights		-.71	-.56	
F		12.78	7.87	
Significance		.01	.05	

Analysis	Multiple R	F	DF	Significance
11.	.95	29.57	2/6	.01
Variables	CL	XS	XT	
B weights and C		.082	.083	-4.43
Beta weights		.81	.63	
F		41.69	25.44	
Significance		.01	.01	

Analysis	Multiple R	F	DF	Significance
12.	.63	4.38	2/13	.05
Variables	XL	XS	XT	
B weights and C		.055	.023	2.51
Beta weights		.527	-.29	
F		5.92	1.76	
Significance		.05	-	

Analysis	Multiple R	F	DF	Significance
13.	.83	6.77	2/6	.05
Variables	FACTOR 5	XT	CT	
B weights and C		-.70	-.78	6.84
Beta weights		-.55	-.55	
F		5.85	5.83	
Significance		.05	.05	

TABLE 64 CONT.

Analysis	Multiple R	F	DF	Significance
14.	.73	8.15	1/7	.05
Variables	XT	CS		
B weights and C		-.81		92.34
Beta weights		-.73		
F		8.15		
Significance		.05		

TABLE 6-5

SIGNIFICANT RESULTS CANONCIAL

Analysis	Eigenvalue	Cancorr		D.F.	Significance
1.	.85	.92	12.04	4	.017
	Variables	Scale 1	Scale 2	CT	XT
	WEIGHTING	-.94	.51	1.00	-.27
Analysis	Eigenvalue	Cancorr		D.F.	Significance
2.	.81	.90	9.30	4	.05
	Variables	Scale 1	Scale 2	CT	XS
	WEIGHTING	-.87	.62	1.01	.09
Analysis	Eigenvalue	Cancorr		D.F.	Significance
3.	.82	.90	10.92	4	.028
	Variables	Scale 3	Scale 5	CS	XT
	WEIGHTING	-.71	.69	1.28	.44
Analysis	Eigenvalue	Cancorr		D.F.	Significance
4.	Variables	Scale 3	Scale 5	CS	XS
	WEIGHTING	.57	.81	1.13	.46

equation at one time. The factors were separated into all possible groups of two and input as criterion variables. The combinations of leadership style formed the set of predictor variables. Four significant results were obtained from 60 analyses.

Aircraft Availability, factor 1, and Flight Operations factor 2, when considered together, and a significant correlation with the emphasis that the CO and XO place on initiating structure behaviors. Eighty-five percent of the variance in Aircraft Availability and Flight Operations was explained when CT and XT were the predictor variables. This result indicates that when the CO places more emphasis on initiating structure, (β for CT was 1.00) and the XO places less emphasis on intiating structure behavior (β for XT was -.27), Flight Operations would tend to be high (β=.51), while Aircraft Availability would tend to be low (β=-.94).

Aircraft Availability, factor 1, and Flight Operations, factor 2, when considered together, additionally had a significant correlation with the emphasis that the CO places on initiating structure and the emphasis that the XO places on consideration. Eighty-one percent of the variance in Aircraft Availability and Flight Operations was explained when CT and XS were the predictor variables. This result indicates that when the CO places emphasis on initiating structure (β for CT was 1.01) and the XO places emphasis on consideration (β=.09), Flight Operations would tend to be

higher(β =.62) and Aircraft Availability would tend to be low (β =-.86).

Manpower Utilization, factor 3, and Maintenance Procedures, factor 5, when considered together, had a significant correlation with the emphasis that the CO places on consideration and the emphasis that the XO places on structure. Eighty-two percent of the variance in Manpower Utilization and Maintenance Procedures was explained when CS and XT were the predictor variables. This result indicates that when the CO places emphasis on consideration (β for CS was 1.28) and the XO places more emphasis on initiating structure (β = -.44), Manpower Utilization would tend to be low (β =-.71) but Maintenance Procedures would tend to be high (β =.69).

Manpower Utilization and Maintenance Procedures had an additional significant correlation with the emphasis that the CO and XO place on consideration as a desired behavior. Ninety-two percent of the variance was explained in Manpower Utilization and Maintenance Procedures when CS and XS were the predictor variables. This result indicates that when the CO places emphasis on consideration (β for CS was 1.13) and the XO places emphasis on consideration (β =.46), Manpower Utilization (β =.57) and Maintenance Procedures (β =.81) would tend to be high.

No significant results with canonical correlation were obtained for the other combinations of leadership style for the four leaders and the factors of aircraft material readiness.

In summary, several signigicant relationships were found between aircraft material readiness, as defined in this study,

and leadership style of the CO-XO dual leadership teams. Bivariate correlation and multiple regression analysis demonstrated that high aircraft material readiness can be predicted by combinations of the leadership styles of these two leaders. Canonical correlation analysis demostrated that tradeoffs exist in the factors of aircraft material readiness when the CO-XO team places emphasis on certain behaviors over others. The tradeoffs were significant and measureable.

Significant relationships existed between individual factors of aircraft material readiness and the leader's underlying need structures, as measured by the LPC, but in only one case did the combination of need structures for two leaders, the CO and the XO, significantly predict a factor of aircraft material readiness, in this case, Aircraft Availability.

No significant relationships between the leadership style of the MCPO and the factors of aircraft material readiness were found. Additionally, the combinations of leadership style for the MCO-MCPO dual leadership team were not found to be significant predictors of any factors of aircraft material readiness.

Mission Capability, factor 4, was not found to demonstrate any significant relationships with either individual dimensions of leadership style of combinations of leadership style for either dual leadership team.

Restrictions caused by reduced sample size in matching leaders to six month summaries of readiness prohibited any analysis of combinations of leadersip style between the CO-XO and MCO-MCPO teams with the factors.

Overall, the results indicated that there are significant relationships between leadership style and aircraft material readiness.

VII. ANALYSIS

Aircraft Material Readiness is a very general term which encompasses many facets of readiness, several of which are outside the control of the squadrons. Readiness categories such as supply and personnel readiness are in general not directly determined by actions that can be taken at the squadron level.

For this study aircraft material readiness was limited to five factors: Aircraft Availability, Flight Operations, Manpower Utilization, Mission Capability, and Maintenance Procedures. It was hypothesized that combinations of leadership style within two dual-leadership teams in the squadron, the Commanding Officer-Executive Officer (CO-XO) team and the Maintenance Control Officer -Maintenance Chief Petty Officer (MCO-MCPO) team, would have significant relationships with aircraft material readiness through the computed factors.

Leadership style in the Light Attack community of Naval Aviation did not follow any preordained patterns but did significantly correlate with several facets of readiness.

There appears no definable pattern in the separation of roles in the squadrons participating in this study. CO's do not tend to be higher in the socio-emotional dimension than XO's in general. The situation where the CO was higher in the socio-emotional dimension, while the XO was higher in the task-related dimension, appeared the largest number of times.

However, the situation where the XO was higher than the CO in both dimensions seemed to overshadow the results appearing in 29% of the cases. The separation of roles for this team appeared to be particulary influenced by the CO's underlying need structure.

This influence was evidenced by the number of significant correlations obtained with the CO's LPC score. CO LPC appeared to have relationships with the CO's structure, (-.67), the XO's consideration (.72), CO's structure (-.70), and CO's consideration (-.56) together, and the XO's consideration (.81) and structure (.63) together.

Only one result appeared that would indicate that the role that the CO takes may influence the role the XO assumes. A significant relationship was found between the CO's consideration and the XO's structure (-.81).

In addition to the relationships that the XO's task-related and socio-emotional dimensions had with the CO, the XO's LPC was found to have a significant relationship with the XO's consideration (.53) and structure (-.29).

No significant relationships were found where either the CO's or XO's leadership style correlated with the MCO and MCPO's leadership style.

For the MCO-MCPO team, the dominant situation, 4 of 9 cases, was for the social and task roles to be split with the MCO assuming the socio-emotional role and the MCPO assuming the task role, (MS-PT). The second most prevalent situation, 3 of 9 cases, was for the MCO to assume the task related role while the MCPO assumed the role as socio-emotional leader (MT-PS).

In summary, the leadership style deemed by the leaders as appropriate for their positions did not appear to be influenced by billet descriptions or traditional roles. The underlying need structure for the CO did appear to have the largest number of relationships with the roles that the CO-XO team perceive they should assume; however, the XO's underlying need structure additionally had a significant relationship with the role he perceived he should assume.

Leadership style did, however, have several significant correlations with readiness and the computed factors of readiness.

Five of the individual variables of readiness had significant correlations with leadership style. FSC had significant relationships with the CO's LPC (.75), the CC's structure (-.84), and MCO's structure (.66). Cannibalizations per flight hour had significant correlations with the CO's structure (-.71), the XO's structure (-.70), and the MCO's structure (-.56). NORM had significant correlations with the CO's LPC (-.67) and the XO's structure (-.52). AWM % NORM had a significant correlation with the XO's structure (-.56). Finally, IMMH had a significant correlation with the MCO's LPC (-.65).

Perhaps more significant to naval aviation than the variables that demonstrated significant relationships with leadership style were the variables that did not have significant correlations. OR, Operationally Ready, the primary statistic used to evaluate squadron performance, and certainly one of the most important to other variables -- as evidenced by

the significant correlations it has with NORM (-.55), FSC (.73), and factor 1, Aircraft Availability, (.90) did not have any significant correlations with leadership style. The highest non-significant correlations for OR appeared with CO LPC (.58) and CO structure (-.64).

Additionally, DMMH and A799 demonstrated no significant relationships with leadership style. These two statistics have received considerable attention from maintenance managers as statistics which indicate trends in manpower utilization and maintenance procedures that were controllable by the squadrons. The highest non-significant correlation for DMMH and leadership style was for the MCO's LPC (-.53). The highest non-significant correlation for A799 with leadership style was for the MCPO's structure (.57).

While it cannot be concluded from this data that leadership has no significant relationship to OR, A799, and DMMH, it would appear that leadership style has no direct relationship. Leadership behavior may well be more influential on these statistics than style, and continued emphasis on these facets of readiness would indeed be appropriate.

Correlations of leadership style and the factors of readiness indicated the same trend as correlations with the individual variables of readiness. The most important leadership styles were for the CO with significant correlations of the CO's LPC (.77) and structure (-.70) with factor 1 Aircraft Availability. The XO had a single significant correlation (-.62) with factor 5, Maintenance Procedures, and the MCO had a significant correlation with Manpower Utilization, factor 3 (-.65).

The only decidedly significant result of leadership style correlations with the factors of readiness was that the CO's consideration score had no significant correlations with the individual variables but demonstrated a significant correlation (.71) with AWM % NORM, NORM, and CANN when these variables were grouped together as factor 5, Maintenance Procedures.

When step-wise multiple linear regression was employed to examine the interactions of the various facets of leadership style within the dual leadership teams with the individual variables of readiness and the factors computed for readiness, two important results were obtained.

First, the MCO-MCPO dual leadership team demonstrated no significant correlations with either the variables or the factors when acting simultaneously. From earlier results of the MCO with the criterion variables, it would appear that the MCO's leadership style had significant relationships with readiness when acting alone but not when acting in tandom with the MCPO. A partial explanation for the complete lack of significant correlations for the MCPO with any possible combination of other variables may lie in the great difference between the MCPO's underlying need structures and their perceived roles in the dimensions of consideration and structure. The MCPO's as a group were one standard deviation above the mean for the LPC, indicating a relatively high relationship orientation, and yet were also significantly above the other leaders in initiating structure. It may be that how the MCPO"s felt they ought to behave and their actual demonstrated behavior bears no correlation. In any event, it would be simply incredulous

to conclude that the MCPO's leadership has no significant relationship to aircraft material readiness.

The second important result obtained with multiple regression concerned the leader's consideration scores. Previous results of bivariate correlation demonstrated no relationships between the CO's or XO's consideration score and either the individual variables of readiness or the factors of readiness. When the variables of readiness were considered with all aspects of the leadership styles of the CO-XO dual leadership team, the CO's consideration score appeared to contribute significantly to AWM % NORM (β - 1.67), RMCM (β=-2.21), FSC (β=-.88), and DMMH (β=2.66). Additionally, the CO's consideration dimension was the most important predictor variable for all of the above, except FSC, where the CO's task-related dimension, CT, was the most important (β=-.99). The XO's consideration dimension appeared to have significant relationships as a predictor with AWM % NORM (β=1.06), RMCM (β = 2.33), and FSC (β=-.73).

These significant results with consideration are important when it is recognized that consideration has had a poor track record of correlating with concerete criterion variables. The larger implication was that when consideration was considered alone no significant correlations resulted. When consideration was employed as a predictor variable in conjunction with the task-related dimension significant correlations resulted. Consideration has previously been relegated to providing relationships with less concrete criterion such as attitudes toward supervisors, intradepartmental stress, supervisory recognition,

and peer ratings. [Fleishman, 1969]. In this study consideration was demonstrated to be a significantly valid predictor of unit performance.

To generalize from these results, it cannot be stated that when the socio-emotional and task-related roles were separated and shared among the leaders of the dual leadership teams, aircraft material readiness was improved. It may be, that the combination of leadership styles are better examined as predictors of aircraft material readiness when all five readiness factors are allowed to interact simultaneously. Sample size severely restricted that possible analysis in this study.

It can,however, be more firmly stated, based on the complete lack of significant results for the MCO-MCPO team, that the CO and XO have a more significant relationship with aircraft material readiness than do the middle managers who actually direct and perform the day to day operations which determine the levels of readiness exhibited by the squadrons.

Another important result concerned one of the primary variables in the Aircraft Availability factor, FSC, full systems capable. FSC has been considered to be one of the most important variables of both operational and combat readiness. This is evidenced by the significant correlation between FSC and OR, operationally ready, the variable most widely used to evaluate squadron readiness, of (.73).

FSC has been for maintenance managers one of the most difficult goals to acheive. Several other variables affect it,

such as, NORS, NORM, RMCS, RMCM, and AVG A/C. In view of this, the relationship between the CO's LPC and FSC becomes a very important result.

An important result for leaders is that while very strong relationships exist between individual variables of leadership style and individual variables and factors of readiness, when the variables are allowed to interact together, more significant relationships are discovered. The implication is that single aspects of readiness can be affected by individual variables of leadership style, but to affect or optimize aircraft material readiness in terms of all variables and all factors, the CO-XO dual leadership team must allow each of the leadership style dimensions to interact simultaneously without supressing any one dimension.

Although no combination of leadership styles for the four leaders in this study was identified as dominant in being assocaited with high aircraft material readiness, several combinations demonstrated the tradeoffs that exist between factors of aircraft material readiness. A high rate of Flight Operations appears to be attained when the CO emphasizes initiating structure as a behavior and the XO emphasizes consideration. High Flight Operations is traded off against reduced Aircraft Availability with this combination of leadership styles.

Similarly, low Manpower Utilization, an indicator of good maintenance, can be attained by the CO's emphasizing consideration and the XO's emphasizing initiating structure.

The tradeoff for efficient Manpower Utilization appears to be excessive AWM % NORM, NORM, and CANN grouped together as Maintenance Procedures.

These conflicting results demonstrate the complex nature of aircraft material readiness but do not lead to any general conclusions about the best combination of leadership style for maintaining a high rate of aircraft material readiness.

Other tradeoffs between the factors of aircraft material readiness for combinations of leadership style within the dual leadership teams may exist, but were not discovered by this study due to limited sample size. All possible combinations of leadership style were not represented, possibly accounting for the lack of results with other factors.

VIII. SUMMARY AND CONCLUSIONS

Readiness, in peace time, is the single most stressed criterion of unit performance in the Navy. Maintaining a high level of readiness whether operational, equipment, personnel, or material readiness becomes, therefore, a major priority for the individual unit.

Although many exogenous variables affect the level of readiness exhibited by the indivdual commands, such as personnel manning, enlisted rate structures, age of equipment, and logistics support leadership has been the variable looked to, to provide the high level of readiness needed to protect this nations's valuable asset, "sea power".

The direct link between readiness and leadership has never been crystal clear. The purpose of this study was to demonstrate that there exists a direct link, measure it, and recommend actions which would improve the relationship. The direct link hypothesized between readiness and leadership was leadership style.

This study has demonstrated that by grouping the commonly collected and assessed variables of readiness in naval aviation into factors which represent readiness more fully than in the traditional sense of simply operational readiness, leadership style has sever significant relationships with the factors of unit effectiveness in maintaining aircraft material readiness.

The Light Attack Community of naval aviation, the focus of this study, has, largely as a result of the complexity of the A7E aircraft, been extraordinarily tasked with demonstrating exceptional leadership in order to maintain a high level of readiness. Frequent changes in mission, sophisticated equipment, and a reduced priority for funding logistics support requirements have severely challenged leaders in the community. Leadership has been necessarily dynamic in maintaining a high level of aircraft material readiness.

It was an important result that the leadership style, not intended leadership behavior, was measured and shown to be a predictor. Leadership style is less dependent upon the situation than is behavior, but is not as easily traced from the leader to the criterion of readiness. Leadership style, or the emphasis that leaders place on the task or on relationships with co-workers and subordinates, is translated into behaviors which allow the leader to accomplish the mission through the group. In this study the mission was high aircraft material readiness. Predicting what leader behaviors would optimize aircraft material readiness would not only require a formula for every situation but would also be impossible for leaders to carry out on a daily basis. Leadership style, on the other hand, is very concise and clean as simply the emphasis that leaders place on supervisory - subordinate relationships. Although no general "best case" was discovered for what emphasis the leaders should place on the tasks or relationships with the group, several important relationships were discovered between emphasis on the dimensions of leadership style and individual factors of aircraft material readiness.

Another important result was that although the leaders' style did not have significant relationships with individual variables within the factors labelled Maintenance Procedures and Flight Operations, the leaders' styles were shown to have significant relationships with the factor themselves. Emphasis on individual statistics, or variables of readiness, may not have the desired effect of improving aircraft material readiness in the broad context, whereas emphasis on the factors may.

Although this study did not produce enough significant results to identify a combination of leadership styles that would improve overall aircraft material readiness, several relationships indicated general conditions for optimizing individual factors.

Aircraft Availability, the most important factor if one had to be picked, was associated with the Commanding Officer. This factor tended to be high when the CO placed more emphasis on the socio-emotional climate of the command rather than on the task.

Manpower Utilization tended to be low when the Maintenance Control Officer placed more emphasis on the task than on the socio-emotional climate of the maintenance department.

Excessive Maintenance Procedures tended to be low when the Executive Officer placed more emphasis on directing group activities through planning, communicating information, scheduling, criticizing, and trying out new ideas. Additionally, excessive Maintenance Procedures tended to be low when the Commanding Officer was more impersonal in his relations with others.

Mission Capability was not found to have any significant relationships with leadership style.

It must be stressed that these relationships, which were associated with high aircraft material readiness, may involve tradeoffs with other factors. The situation where the CO emphasizes the socio-emotional dimension, which is associated with high Aircraft Availability, is also associated with excessive Maintenance Procedures. Excessive Maintenance Procedures would be the case where AWM% NORM, NORM, and CANN rates were high indicative of a less than desirable situation, in the long run.

The tradeoff for high Flight Operations appeared to be reduced Aircraft Availability. The tradeoff for more efficient Manpower Utilization appeared to be increased use of excessive Maintenance Procedures.

Over interpretation of the results must be warned against because of the small sample size. It is hoped that this study can be expanded into Heavy Attack and Fighter communities. The same criterion data of readiness is collected in these other communities of naval aviation and the same leader positions are employed to direct the readiness effort.

Because of the practice of "fleeting up" of Executive Officers to Commanding Officers, unique to the aviation community, it is suggested that this study should be first in a longitudinal study to take place over several years. This kind of study would make it possible to examine further the effects of the perceived role, or leadership style, on aircraft material readiness.

APPENDIX A

READINESS VARIABLES

1. AVG NO. RPTG ACFT. - Average number of reporting aircraft: the number of hours that aircraft are reported in a readiness reportable status, (RRS), divided by the total number of hours in the reporting period.
2. TOT % NORS - Total percentage not-operationally ready, due to supply: The number of not-operationally ready hours due to supply, divided by the number of hours that aircraft are reported in an RRS status.
3. TOT % NORM - Total percentage not-operationally ready due to maintenance: The number of not-operationally ready hours due to scheduled and unscheduled maintenance, divided by the numbers of hours that aircraft are reported in an RRS status.
4. UNSCH % NORM - Percentage not-operationally ready due to unscheduled maintenance: The number of not-operationally ready hours due to unscheduled maintenance, divided by the number of hours that aircraft are reported in an RRS status.
5. AWM % OF TOT NORM - Awaiting maintenance percentage of total not-operationally ready due to maintenance: The number of awaiting maintenance hours, divided by the total number of hours aircraft are reported as not-operationally ready due to scheduled and unscheduled maintenance.
6. ACT % OR - Actual percent readiness achieved: The number of hours aircraft are reported in an RRS status, less the not-operationally

ready hours due to supply, scheduled and unscheduled maintenance, divided by the total hours aircraft are reported in an RRS status.

7. TOT % RMC-NFE - Total percentage of reduced material condition due to not fully equipped: The number of reduced material condition hours due to not being fully equipped because of supply, divided by the number of hours aircraft are reported in an RRS status.

8. TOT % RMCM - Total percentage of reduced mission capability due to maintenance: The number of reduced mission capable hours due to scheduled and unscheduled maintenance, divided by the number of hours aircraft are reported in an RRS status.

9. TOT % UNSCH RMCM - Total percentage reduced mission capability due to unscheduled maintenance: The number of reduced mission capable hours due to unscheduled maintenance, divided by the number of hours aircraft are reported in an RRS status.

10. TOT % RSC - Total percentage full systems capable: The number of hours aircraft are reported in an RRS status less the not operationally ready hours due to supply, scheduled and unscheduled maintenance, less the reduced material condition hours due to not fully equipped because of supply, scheduled and unscheduled maintenance, divided by the total number of hours aircraft are reported in an RRS status.

11. AVG FLT UTL/ACFT - Average flight utilization per aircraft: The number of flight hours, divided by the average number of reporting aircraft.

12. AVG FLT/ACFT - Average flights per aircraft: The number of flights, divided by the average number of reporting aircraft.

13. ACT DMMH/FH - Actual direct maintenance man-hours per flight hour: The number of man-hours reported, divided by the number of flight hours.

14. IMA DMMH/FH - Intermediate direct maintenance man-hours per flight hour: The number of man-hours as reported by other than organizational level activities, divided by the number of flight hours.

15. CANN - Cannibalizations per flight hour: The number of cannibalization actions taken per month, divided by the number of flight hours for that month.

16. A799 - No-Defect rate: The number of parts inducted into the intermediate level maintenance activity, (IMA) per month, which contained no defect, divided by the number of components processed by the IMA for that activity.

APPENDIX B

FLEISHMAN'S LEADERSHIP OPINION QUESTIONNAIRE

1. Put the welfare of your unit above the welfare of any person in it.
2. Give in to your subordinates indiscussion with them.
3. Encourage after-duty work by persons of your unit.
4. Try out your own new ideas in the unit.
5. Back up what persons under you do.
6. Criticize poor work.
7. Ask for more than the persons under you can accomplish.
8. Refuse to compromise a point.
9. Insist that persons under you follow to the letter those standard routines handed down to you.
10. Help persons under you with their personal problems.
11. Be slow to adopt new ideas.
12. Get the approval of persons under you on important matters before going ahead.
13. Resist changes in ways of doing things.
14. Assign persons under you to particular tasks.
15. Speak in a manner not to be questioned.
16. Stress importance of being ahead of other units.
17. Criticize a specific act rather than a particular member of you unit.
18. Let the persons under you do their work the way they think is best.
19. Do personal favors for persons under you.
20. Emphasis meeting of deadlines.
21. Insist that you be informed on decisions made by persons under you.
22. Offer new approaches to problems.

23. Treat all persons under you as your equal.

24. Be willing to make changes.

25. Talk about how much should be done.

26. Wait for persons in your unit to push new ideas.

27. Rule with an iron hand.

28. Reject suggestions for changes.

29. Change the duties of persons under you without first talking it over with them.

30. Decide in detail what shall be done and how it shall be done by the persons under you.

31. See to it that persons under you are working up to capacity.

32. Stand up for persons under you, even though it makes you unpopular with others.

33. Put suggestions made by persons in the unit into operation.

34. Refuse to explain your actions.

35. Ask for sacrifices from persons under you for the good of your entire unit.

36. Act without consulting persons under you.

37. "Needle" persons under you for greater effort.

38. Insist that everything be done your way.

39. Encourage slow-working persons in your unit to work harder.

40. Meet with the persons in your unit at certain regularly scheduled times.

APPENDIX C

FIEDLER'S LEAST PREFERRED CO-WORKER QUESTIONNAIRE

Instructions: Describe the person with whom you can work least well:

1.	Pleasant	:	8	7	6	5	4	3	2	1	:	Unpleasant
2.	Friendly	:	8	7	6	5	4	3	2	1	:	Unfriendly
3.	Doesn't like what you do	:	8	7	6	5	4	3	2	1	:	Likes what you do
4.	Helpful	:	8	7	6	5	4	3	2	1	:	Not Helpful
5.	Unenthu-siastic	:	8	7	6	5	4	3	2	1	:	Enthusiastic
6.	Lots of fun	:	8	7	6	5	4	3	2	1	:	Serious
7.	Nervous	:	8	7	6	5	4	3	2	1	:	Relaxed
8.	Hard to get to know	:	8	7	6	5	4	3	2	1	:	Easy to get to know
9.	Doesn't like people	:	8	7	6	5	4	3	2	1	:	Likes people
10.	Co-operative	:	8	7	6	5	4	3	2	1	:	Un-cooperative
11.	He would back you up when you needed it	:	8	7	6	5	4	3	2	1	:	He would criticize you a lot
12.	Boring	:	8	7	6	5	4	3	2	1	:	Interesing
13.	Likes to argue	:	8	7	6	5	4	3	2	1	:	Doesn't argue much
14.	Self Confident	:	8	7	6	5	4	3	2	1	:	Not self confident
15.	He gets things done	:	8	7	6	5	4	3	2	1	:	Inefficent

APPENDIX C CONT.

16.	Always unhappy	:	8	7	6	5	4	3	2	1	: Cheerful

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